

# The Impact of COVID-19 Pandemic and Quarantine Process a Center in Turkey on Anxiety Levels of Pediatric Patients with Epilepsy

## Türkiye'deki Bir Merkezde COVID-19 Pandemisi ve Karantina Sürecinin Epilepsili Çocuk Hastaların Kaygı Düzeylerine Etkisi

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### Abstract

**Introduction:** In this study, we aimed to compare the levels of state and trait anxiety in pediatric patients with epilepsy and healthy controls during the COVID-19 outbreak in Turkey.

**Materials and Methods:** In this study, the state (STAI-I) and trait (STAI-II) anxiety scales were applied to patients between the ages of 10-17 years that had been followed due to epilepsy and were in quarantine. Anxiety status and potential risk factors were compared with healthy age and gender-matched control group.

**Results:** This study included 40 epilepsy patients and 40 controls. Among the patients in the epilepsy group 92.5% had moderate and 7.5% had severe anxiety (mean value of STAI-I and STAI-II were 40.3±4.8 and 40.9±10.5, respectively). There was no significant difference between epilepsy and controls groups in terms of mean STAI-I and STAI-II scale scores (p=0.756, 0.914). When the state anxiety scores were categorized as low, moderate, and high anxiety levels, moderate-to-high state anxiety was detected in the epilepsy group, and moderate-to-low state anxiety in the control group. The state anxiety level was found to be high in patients with high seizure frequency (p=0.045). No significant relationship was found between state and trait anxiety scale scores and factors such as epilepsy duration, quarantine duration, seizure type, drug resistance, and type of antiepileptics.

**Conclusion:** In situations that commonly affect community health, clinicians should focus also on the mental health of epileptic patients. Therefore, we believe that mental health support should be provided to pediatric patients with epilepsy.

### Öz

**Giriş:** Bu çalışmada, Türkiye'de COVID-19 salgını sırasında epilepsili çocuk hastalar ile sağlıklı kontrollerin durumluk ve sürekli kaygı düzeylerini karşılaştırmayı amaçladık.

**Gereç ve Yöntem:** Bu çalışmada, epilepsi nedeniyle izlenen ve karantinaya alınan 10-17 yaş arası hastalara durumluk (STAI-I) ve sürekli (STAI-II) anksiyete ölçekleri uygulandı. Anksiyete durumu ve potansiyel risk faktörleri sağlıklı yaş ve cinsiyet uyumlu kontrol grubu ile karşılaştırıldı.

**Bulgular:** Bu çalışmaya 40 epilepsi hastası ve 40 kontrol dahil edildi. Epilepsi grubundaki hastaların %92,5'i orta ve %7,5'i şiddetli anksiyeteye sahipti (ortalama STAI-I ve STAI-II değeri sırasıyla 40,3±4,8 ve 40,9±10,5 idi). STAI-I

### Keywords

COVID-19 pandemic, epilepsy, anxiety, quarantine

### Anahtar kelimeler

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ve STAI-II ölçek puan ortalamaları açısından epilepsi ve kontrol grupları arasında anlamlı fark yoktu ( $p=0,756, 0,914$ ). Durumluk kaygı puanları düşük, orta ve yüksek kaygı düzeyi olarak kategorize edildiğinde, epilepsi grubunda orta-yüksek durumluk kaygı, kontrol grubunda orta-düşük durumluk kaygı saptandı. Nöbet sıklığı yüksek olan hastalarda durumluk kaygı düzeyi yüksek bulundu ( $p=0,045$ ). Durumluk ve sürekli kaygı ölçeği puanları ile epilepsi süresi, karantina süresi, nöbet tipi, ilaç direnci, antiepileptik türü gibi faktörler arasında anlamlı bir ilişki bulunmadı.

**Sonuç:** Toplum sağlığını yaygın olarak etkileyen durumlarda klinisyenler epileptik hastaların ruh sağlığına da odaklanmalıdır. Bu nedenle epilepsili çocuk hastalara ruh sağlığı desteği verilmesi gerektiğine inanıyoruz.

## Introduction

Epilepsy is one of the common chronic conditions in childhood and children with epilepsy are at risk for psychiatric disorders (1). Psychological deterioration associated with epilepsy lowers quality of life, increases health care costs, and reduces compliance with antiepileptic drugs (2-4). Early diagnosis of deterioration in mental health can improve disease management and prognosis (5,6).

COVID-19, caused by a novel coronavirus called SARS-CoV-2, first originated from Wuhan city, China on 08 December 2019 and since spread to the entire world (7). The lack of effective treatments and ease of infection through contact and aerosols have contributed to a massive panic all over the world. This can be compared to other important public health emergencies, such as the global SARS outbreak in 2002 and the MERS outbreak in 2012. These conditions may threaten the mental health of the affected population, and create anxiety and panic that may affect the course of the disease in those with chronic conditions, which in turn may cause disruption in treatment (8).

In this study, we compared pediatric epilepsy patients and healthy controls in terms of severity of anxiety during the COVID-19 pandemic outbreak in Turkey. We also investigated risk factors for anxiety among pediatric patients with epilepsy.

## Materials and Methods

Aged 10-17 years who were followed up by İstanbul Medipol University Hospital Pediatric Neurology Clinic with the diagnosis of epilepsy were included in the study. The state anxiety scale (STAI-I) and trait anxiety scale (STAI-II) questionnaires were applied to those patients between the dates of July-September 2020.

Patients with intellectual disability, additional psychiatric disease, newly diagnosed patients (within the last 6 months), those who could not understand the

questionnaire questions and those who did not want to answer were excluded from the study. Patients with systemic or chronic diseases comorbid with epilepsy were not included in the study. The control group consisted of 40 age and gender-matched healthy children. The control group consisted of children who came to the general pediatric outpatient clinic for routine check-up.

Epilepsy was defined based on the description provided in the 2014 International League Against Epilepsy (ILAE) as having more than two consecutive seizures or two non-triggered seizures in more than 24 hours and the probability of recurrent seizures in the next 10 years being more than 60% (9). Epilepsy was classified into two types: focal and generalized (10). The drug response was determined according to the definition of ILAE and patients were classified as having or not having drug-resistant epilepsy (11).

State anxiety is the fear that the individual feels due to the stressful situations, and is an indicator of the individual's feelings of tension and uneasiness. The State Anxiety Inventory (STAI-I) was developed by Spielberger et al. (12) in 1970. The scale consists of 20 questions, answers to which range from 1-4. The total score value obtained from the scale ranges between 20 and 80.

Trait anxiety indicates a relatively constant anxiety that does not arise in response to a particular situation or time. The Trait Anxiety Inventory (STAI-II) was also developed by Spielberger and consists of 20 items and provides a four-point Likert-type measurement (1-never to 4-completely). It was used to determine the validity of the overlap.

High scores on both scales indicate that the level of anxiety is high. Scores <30 points indicate low anxiety, scores between 31-49 points indicate moderate anxiety, and scores >50 points show high anxiety (12,13). STAI-I and STAI-II (12) have been used extensively in research with both adults and adolescents (>14 age). Öner and Le Compe (13) have been adopted the

validity and reliability of the STAI-I and STAI-II to the Turkish.

After the participants were informed via phone conversations, the STAI-I and STAI-II questionnaires were filled out by messaging or face-to-face interviews. In addition, we also collected information regarding age, gender, medical history (including additional psychiatric disease, seizure type and treatment history), antiepileptics used, duration and frequency of seizures, quarantine duration, presence of seizures during COVID-19 pandemic, presence of COVID-19 infected individuals in their family, pandemic-related death in the family, and the presence of pandemic-related anxiety in the family.

Age groups were categorized as 10-13 and 14-17 years old. All variables and STAI-I and STAI-II total scores were evaluated statistically.

The study was approved by the Ethics Committee of İstanbul Medipol University Faculty of Medicine (approval number: 10840098-604.01.01-E.15397, date: 20.05.2020) and informed consent was obtained from participants' caregivers.

#### Statistical Analysis

The data was analyzed with the help of descriptive statistics and frequency analysis. Frequency analysis was also used to calculate rates and percentages. The Kolmogorov-Smirnov test and the Levene test indicated that the mean scores of the STAI-I and STAI-II scales showed normal distribution, and therefore a parametric independent two-sample t-test was used for their analysis. In addition, one-way variance analysis (ANOVA) test was used for variables with more than two groups. The Pearson correlation coefficient test was used to analyze the presence of correlations

between various factors and STAI-I and STAI-II scores. SPSS 22 package program was used for the statistical tests of the study. Statistical significance was designated as  $p < 0.05$ .

#### Results

Forty of 150 children with epilepsy who were invited to participate in the study agreed to complete the questionnaire. Forty age and gender-matched healthy individuals were recruited as a control group. One family member from each of the epilepsy group and the control group died due to COVID-19 infection. Focal epilepsy was present in 19 patients (47.5%) and generalized epilepsy in 21 patients (52.5%). Nine patients (22.5%) had drug resistance. Mean time since the diagnosis of epilepsy was  $3.5 \pm 0.9$  years (1-4 years), mean time between seizures was  $19.9 \pm 16.2$  months (range: two times a week to 48 months), mean time since the last seizure was  $1.7 \pm 1.3$  years (range: 5 days to 4 years ago). There were 3 patients (7.5%) that experienced seizures during the pandemic. Age, gender, quarantine duration, mean STAI-I and STAI-II total scores were similar in both groups (Table 1).

In the epilepsy group, no significant difference was found between the age groups in terms of mean STAI-I and STAI-II scores ( $p = 0.582$ ,  $p = 0.568$ ). However, a significant difference was found between the age groups in terms of STAI-I and STAI-II scores in the control group ( $p = 0.011$ ,  $p < 0.001$ ). Both scores of 14-17 age group were higher than those of the 10-13 age group (Table 1).

The mean STAI-I scores for the epilepsy and the control group were  $40.3 \pm 4.8$  and  $40.9 \pm 10.5$ , respectively, while the mean STAI-II scores were  $41.5 \pm 8.9$  and  $41.3 \pm 9.4$ , respectively. There was no

Table 1. Demographic characteristics, quarantine duration, and mean scores of STAI-I and STAI-II for the epilepsy and control groups

	n/mean	n/mean	Significance for STAI-I scores		Significance for STAI-II scores	
	Epilepsy group	Control group	Epilepsy group	Control group	Epilepsy group	Control group
Age (years)	14±2.0	13.9±2.9	p=0.726	p=0.731	p=0.728	p=0.725
Gender	21(M) 19 (F)	20 (M), 20 (F)	p=0.558	p=0.621	p=0.715	p=0.732
Quarantine duration (days)	54.0±17.7	53.6±15.0	p=0.204	p=0.674	p=0.625	p=0.405
Age groups						
10-13 years	17	17	p=0.582	p=0.568	<b>p=0.011</b>	<b>p&lt;0.000</b>
14-17 years	23	23				

STAI: State Trait Anxiety Inventory, M: Male, F: Female

statistically significant difference between epilepsy and control group in terms of mean total STAI-I and STAI-II scores ( $p=0.756$ , and  $0.914$ , respectively). When STAI-I scores were categorized as low, moderate and high, most of the patients were found to be in the moderate group. When compared with the control group, the patient group had a significantly more individuals that had moderate to high anxiety ( $p=0.014$ ). Categorization of STAI-II mean scores showed that most individuals in both epilepsy and

control groups had moderate anxiety and there was no significant difference between the two groups ( $p=0.776$ ) (Table 2). There was no significant relationship between mean total scores of STAI-I and STAI-II scales with factors such as epilepsy duration, seizure type, type of medication used, and presence of drug resistance ( $p>0.05$ ) (Table 3).

In the epilepsy group the patients that had high anxiety in the family had significantly higher mean STAI-I scores ( $p=0.015$ ). However, there was no

Table 2. STAI-I and STAI-II scales score values of the epilepsy and control groups

	Low		Moderate		High		p
	n	%	n	%	n	%	
STAI-I scores							
Epilepsy group	0	0	37	92.5	3	7.5	0.014
Control group	7	17.5	27	67.5	6	15	
STAI-II scores							
Epilepsy group	4	10	30	75	6	15	0.776
Control group	6	5	29	72.5	5	12.5	

STAI: State Trait Anxiety Inventory

Table 3. Relationship between seizure, treatment characteristics and STAI-I and STAI-II mean scores

Features of epilepsy		STAI-I	STAI-I p value	STAI-II	STAI-II p value
Seizure frequency	Once a week	1	<b>0.045</b>	2.5	0.150
	More than once a week	2		5.0	
	Once a month	2		5.0	
	Once in 2-3 months	3		7.5	
	Once in 3-6 months	2		5.0	
	Once in 6-12 months	4		10.0	
	Once a year	7		17.5	
	Less than once a year	19		47.5	
Duration of epilepsy	6-9 months	38.3±1.4	0.323	42.6±6.3	0.842
	9-12 months	45.3±5.8		40.6±3.1	
	1-2 years	41.0±1.6		38.2±3.8	
	More than 2 years	39.8±0.8		42.1±1.7	
Type of seizure	Focal seizure	19	0.107	47.5	0.178
	Generalized seizure	21		52.5	
Type of medication	Carbamazepine	8	0.074	20	0.254
	Valproic acid	15		37.5	
	Levetiracetam	11		27.5	
	Valproic acid + Lamotrigine	3		7.5	
	Benzodiazepine	3		7.5	
Drug resistance	Present	9	0.354	22.5	0.432
	Absent	31		77.5	

STAI: State Trait Anxiety Inventory

significant difference in mean STAI-II scale scores between those with and without anxiety in the family ( $p=0.074$ ). In the control group, there was a significant difference in terms of mean scores for STAI-I and STAI-II scales and anxiety increase in the family ( $p=0.006$  and  $p=0.008$ , respectively) (Table 4).

Correlation analysis revealed a significant positive correlation between STAI-I and STAI-II mean scores ( $p<0.001$ ). Accordingly, individuals with low STAI-I scores generally had low STAI-II scores, participants with moderate STAI-I scores also had moderate STAI-II scores, but individuals with high STAI-I scores had moderate or high STAI-II scores.

### Discussion

The aim of this study was to determine anxiety states of pediatric epileptic patients during the COVID-19 outbreak, compare them with the anxiety state of healthy controls in the same region and investigate risk factors associated with anxiety. To the best of our knowledge, there is no other study in the literature evaluating anxiety states of pediatric epilepsy patients during the COVID-19 pandemic.

There are numerous studies reporting anxiety and depressive symptoms are more severe in epileptic patients than in healthy controls (14-16). In a study conducted with 35 pediatric epilepsy patients and 35 healthy controls, the trait-anxiety and depression scores were higher in the 12-16 age group, and the trait anxiety scores were higher in the 9-11 age group of patients with epilepsy (15). In our study, the state and trait anxiety scores were similar in 14-17 years and 10-13 years age groups. In the control group, both the state and trait anxiety scores of the 14-17 years age group were higher than those of 10-13 years age group.

Adaptation difficulties experienced in the natural course of adolescence, where psychological and physical development and change occur, may lay the groundwork for psychiatric disorders. The most common psychiatric disorders that occur during this period are anxiety disorders and depression. The prevalence of anxiety in adolescents ranges from 0.6% to 7% (17,18). Therefore, it is anticipated that the anxiety levels of children between the ages of 14-17, which correspond to the adolescence of healthy children, are higher than the younger age groups.

It is thought that in children with epilepsy, anxiety can be seen with more autonomic and agitation responses, while in adolescents anxiety associated with cognitive symptoms and social isolation is in the foreground (14,19). Fear of having seizures in social environments, especially in adolescents, may result in avoiding social environments. Since our patients were quarantined due to the pandemic, their isolation from social environments may have reduced their fear of having a seizure in public and did not cause an additional increase in their anxiety.

In our study, the state anxiety and trait anxiety mean scores in epilepsy patients were similar to the control group, suggesting that a global environmental stress factor such as COVID-19 may psychologically affect all children and not only children with chronic diseases. In epilepsy, anxiety disorders can be associated with variable conditions. The symptoms of anxiety may be related to the environment in which epileptic children have seizures and this may result in avoiding social environments altogether. In our study, the necessity of quarantining in their home environment during the pandemic did not increase their anxiety, on the contrary, they felt more secure.

State anxiety is a form of anxiety that occurs due to environmental stress, mostly due to certain logical causes, can be understood by others, and is usually caused by temporary situation in individual's life (20,21). Therefore, it is not surprising that the state anxiety was found to be similar to both healthy children and children with epilepsy during the COVID-19 pandemic.

Although the STAI-I mean scores of the two groups were similar, categorization of anxiety levels as low, moderate and high indicated that most of the individuals in both the epilepsy and the control groups had moderate state anxiety. However, while the

Table 4. STAI-I and STAI-II mean scores between those with and without anxiety in the family

	With anxiety in the family	Without anxiety in the family
	Epilepsy group versus control group	Epilepsy group versus control group
STAI-I scores	$p=0.015$	$p=0.006$
STAI-II scores	$p=0.074$	$p=0.008$

STAI: State Trait Anxiety Inventory



epilepsy group skewed towards moderate-to-high state anxiety, the control group skewed towards moderate-to-low. Considering that physical diseases are factors of environmental stress, it is expected that the level of state anxiety, which may change depending on environmental factors, is relatively higher in children with epilepsy (22). In a study conducted by Bilgiç et al. (23) the state anxiety level was reported to be higher in pediatric patients with epilepsy compared to the control group, while the trait anxiety levels were similar.

The prevalence of anxiety disorder in children and adolescents with epilepsy has been reported to be between 5-33% (24). In our study, moderate state anxiety was observed in children with epilepsy. Despite the extraordinary circumstances and small sample size, we were able to detect moderate level of anxiety in these patients, which may also be explained by the nature of the disease. However, in the field of epilepsy, some studies have conflicting results, where some report elevation in both state and trait anxiety scores due to anxiety, while other report no difference. Therefore detailed studies are needed to better understand the relationship between state and trait anxiety scores in patients with epilepsy.

Some of the antiepileptic drugs increase anxiety in patients, while others decrease it. Antiepileptics that have a dominant glutamatergic effect cause stimulation, weight loss and anxiety. On the other hand, antiepileptics that increase the GABAergic transmission (benzodiazepines, barbiturates, tiagabine, gabapentin, etc.) cause sedation, cognitive slowing, and weight gain, as well as a decrease in anxiety. Vigabatrin, tiagabine, gabapentin, pregabalin and valproate are effective in the treatment of anxiety disorders (14). In our study, the type of drug used did not affect the level of state and trait anxiety. Early age of onset, poor seizure control, increased seizure activity, and seizure severity have been shown to be risk factors for anxiety symptoms in epilepsy (25). However, we could not find a relationship between seizure frequency, severity, duration, seizure type and anxiety levels, including the types of drugs used. The small sample size of our sample, the relatively small number of drug-resistant epilepsy groups, 37 patients receiving monotherapy, and only 3 patients receiving dual drug therapy reduced the chance of evaluating

severe epilepsy cases in our study, which affected our results.

In the literature, studies are reporting that anxiety disorders are more common among female children and adolescents with epilepsy, as well as studies that show no significant effect of gender on anxiety (26). High anxiety in girls has been associated with increased seizure severity (26,27). Hoare and Kerley (28) however, did not find a difference between the genders in the distribution of anxiety and depression in children with epilepsy. There was no significant effect of gender on anxiety in our study as well.

Numerous studies have defined increasing seizure frequency as a risk factor for anxiety disorders (15,29,30). However, there is still no consensus on the relationship between anxiety and frequency of seizures and lateralization of the focus (31). The sudden occurrence of seizures in epilepsy patients causes the person not to feel in control over his/her body and therefore to be under constant stress (32). In our study, we found that state anxiety increased with the increase in the frequency of seizures, but no significant change was found for trait anxiety. It has been suggested that in some patients with epilepsy anxiety may be associated with fear of recurrence of seizures and loss of control, and the frequency of seizures may be related to the perception of danger such as falling and dying at the time of seizure (14). The high number of deaths during the pandemic may have created additional stress for seizure anxiety and increased the state anxiety scores.

Considering that the increase in anxiety in the family, which may change with environmental factors, is related to acute anxiety, it is expected that the mean total score of STAI-I was high in the group with high anxiety. Meanwhile the mean total score of STAI-II, which represents anxiety independent of environmental factors, is not expected to be affected by anxiety increase.

#### *Study Limitations*

There were some limitations of the study. The small sample group, the fact that the previous anxiety levels of both the epilepsy and control groups were not evaluated, and only the evaluation of the quarantine period are limitations. The low number of severe epilepsy cases receiving polytherapy is another limitation that impairs the homogeneity of the study. Another limitation is that the effects of antiepileptic

drugs used by the cases on mood and anxiety levels were not evaluated.

### Conclusion

The pandemic affects the mental health of the entire community. Adolescents, in particular, are at a greater risk. Considering the damages that anxiety disorders may cause during the pandemic, psychological support is required for the pediatric population. The increase in state anxiety levels of epileptic patients during the pandemic highlights the requirement for mental health support along with their seizure management.

### Ethics

*Ethics Committee Approval:* The study was approved by the Ethics Committee of İstanbul Medipol University Faculty of Medicine (approval number:10840098-604.01.01-E.15397, date: 20.05.2020). Written informed consent was obtained from all participants and their legal guardians. The authors assure that all applied procedures comply with the ethical standard of relevant committees on human experimentation and are in accordance with the Helsinki Declaration.

*Conflict of Interest:* The authors have not declared any conflict of interest related to this article.

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